

**Response to Restriction Requirement**

Applicant: Naoto Kawamura et al.

Serial No.: 10/699,147

Filed: Oct. 31, 2003

Docket No.: 200207667-2

Title: INTERCONNECT CIRCUIT

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**IN THE CLAIMS****Amendments to the Claims**

**This listing of claims will replace all prior versions, and listings, of the claims:**

1. (Original) A fluid ejection system comprising:  
a chute structured to receive a fluid ejecting device;  
a contact array comprising a plurality of contact bumps disposed in the chute, the contact array being one of at least two contact arrays each having a different pattern of contact bump locations, wherein a portion of the contact bumps of each contact array are capable of obtaining identity information from the fluid ejecting device and are located in a same location in each contact array, and wherein another portion of contact bumps of each contact array are capable of sending signals to operate the fluid ejecting device and are located in different locations in each contact array.
2. (Original) The fluid ejection system of claim 1, wherein one of the contact arrays includes a first pair of columnar arrays of contact bumps and a second pair of columnar arrays of contact bumps disposed on a wall of the chute, the columnar arrays of each pair converging toward each other in a direction toward a lower portion of the chute.
3. (Original) The fluid ejection system of claim 1, wherein the array of contact bumps includes at least one columnar array of contact bumps that is substantially linear.
4. (Original) The fluid ejection system of claim 1, wherein one contact array has a width of less than about 12 mm.
5. (Original) The fluid ejection system of claim 1, wherein the portion of the contact bumps of each contact array capable of obtaining identity information for the print cartridge are the same in number in each contact array.
6. (Original) A printing apparatus comprising:

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a cartridge comprising either one of:

- a) a first cartridge having a first contact array including a plurality of contact areas; or
- b) a second cartridge having a second contact array including a plurality of contact areas, wherein locations of the contact areas of the first contact array are different from locations of the contact areas of the second contact array;

a carriage that interchangeably receives the first cartridge and the second cartridge;

and

a controller that identifies whether the first cartridge or the second cartridge is installed in the carriage.

7. (Original) The printing apparatus of claim 6, wherein a portion of the contact areas of the first contact array and a portion of the contact areas of the second contact array are similarly located on the first cartridge and second cartridge, respectively.

8. (Original) The printing apparatus of claim 7, wherein the similarly located contact areas of the first and second cartridges comprise contact areas used by the controller to identify whether the first cartridge or the second cartridge is installed in the carriage.

9. (Original) The printing apparatus of claim 6, wherein the carriage mechanically interchangeably receives both the first and second cartridges in a same chute, and wherein the carriage is configured for electrical operability with one of the first and second cartridges.

10. (Original) The printing apparatus of claim 6, wherein the first cartridge and the second cartridge each comprise a cartridge body having a lower portion and a vertical wall, a printhead attached to the lower portion; and wherein one of the first and second contact arrays includes a first pair of columnar arrays of contact areas and a second pair of columnar arrays of contact areas disposed on the vertical wall, the columnar arrays of each pair converging toward each other in a direction toward the lower portion.

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11. (Original) The printing apparatus of claim 6, wherein the first contact array includes at least one columnar array of contact areas that is substantially nonlinear, and wherein the second contact array includes at least one columnar array of contact areas that is substantially linear.

12. (Original) The printing apparatus of claim 6, wherein the first contact array has a width of less than about 12 mm, and wherein the second contact array has a width of more than about 12 mm.

13. (Original) The printing apparatus of claim 6, wherein only one of the first and second cartridges is compatible for use with the printing apparatus.

14. (Original) The printing apparatus of claim 6, wherein the carriage includes at least two chutes, each chute configured to interchangeably receive either one of the first cartridge and the second cartridge, wherein the first cartridge is compatible for use only in a first chute of the print carriage and the second cartridge is compatible for use in a second chute of the print carriage.

15. (Withdrawn) A method of preventing incorrect use of a print cartridge in a printing apparatus, comprising:

providing a print cartridge with a contact array having a plurality of uniquely positioned contact areas and a plurality of commonly positioned contact areas, wherein the commonly positioned contact areas are arranged to make electrical contact with a printing apparatus of more than one printing apparatus family, and wherein the uniquely positioned contact areas are arranged to make electrical contact with a printing apparatus of one printing apparatus family;

installing the print cartridge in a printing apparatus, the printing apparatus having a controller for exchanging information with the print cartridge;

obtaining information from the print cartridge using the commonly positioned contact areas to determine if the print cartridge is suitable for use with the printing apparatus.

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16. (Withdrawn) The method of claim 15, wherein obtaining information from the print cartridge comprises:

reading a first commonly positioned contact area to determine if a print cartridge is installed in the printing apparatus; and

reading second commonly positioned contact area to determine if an installed print cartridge is suitable for use with the printing apparatus.

17. (Withdrawn) The method of claim 16, wherein reading a first commonly positioned contact area comprises reading a resistor contact area.

18. (Withdrawn) The method of claim 17, wherein reading a resistor contact area comprises reading a temperature sense resistor.

19. (Withdrawn) The method of claim 16, wherein reading a second commonly positioned contact area comprises reading an identification bit contact area.

20. (Withdrawn) The method of claim 19, wherein reading an identification bit contact area comprises reading a resistor.

21. (Original) A printing apparatus comprising:

a carriage including at least a first chute and a second chute, each chute structured to interchangeably receive one of a group of fluid ejection devices including at least a first a fluid ejecting device and a second fluid ejecting device;

a contact array disposed in each of the chutes, each contact array comprising a plurality of contact bumps, the contact array in each chute being one of a group of at least two contact arrays, each contact array in the group of contact arrays having a different pattern of contact bump locations, wherein a portion of the contact bumps of each contact array are capable of obtaining identity information from each of the at least first and second fluid ejecting devices, and wherein another portion of contact bumps of each contact array are capable of sending signals to operate only one of the at least first and second fluid ejecting devices.

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22. (Original) The printing apparatus of claim 21, wherein the portion of the contact bumps capable of obtaining identity information are located in a same location in each contact array of the group.

23. (Original) The printing apparatus of claim 21, wherein the another portion of the contact bumps capable of sending signals to operate are located in different locations in each contact array of the group.

24. (Original) The printing apparatus of claim 21, wherein the another portion of the contact bumps of the contact array in the first chute are capable of sending signals to operate the first fluid ejecting device, and wherein the another portion of the contact bumps of the contact array in the second chute are capable of sending signals to operate the second fluid ejecting device.

25. (Withdrawn) A method of determining the identity of a fluid ejecting device in a fluid ejecting system, comprising:

providing the fluid ejecting system with a contact array having a plurality of contact bumps, wherein a portion of contact bumps of the contact array are low current contact bumps positioned to obtain identity information from a plurality of fluid ejecting devices, and wherein another portion of contact bumps of the contact array are positioned to send signals to operate only a portion of the plurality of fluid ejecting devices; and

obtaining identity information from a fluid ejecting device in contact with the contact array using the low current contact bumps.

26. (Withdrawn) The method of claim 25, wherein obtaining identity information comprises:

energizing a first low current contact bump to determine if a fluid ejecting device is in electrical contact with the contact array; and

energizing a second low current contact bump if a fluid ejecting device is in electrical contact with the contact array to obtain a fluid ejecting device identity.

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27. (Withdrawn) The method of claim 26, wherein energizing a first low current contact bump energizes a resistor in the fluid ejecting device.

28. (Withdrawn) The method of claim 26, wherein energizing a second low current contact bump reads an identification bit in the fluid ejecting device.

29. (Withdrawn) The method of claim 25, wherein obtaining identity information from a fluid ejecting device in contact with the contact array using the low current contact bumps comprises providing a current to each of the plurality of contact bumps, at a magnitude of current that is less than the current required to fire heater elements located on the fluid ejecting device.